

I claim:

- 1    1.    A magnetometer comprising:  
2        an electrically conducting string, the string receiving a current; and  
3        means for supporting the string in tension at two locations;  
4        the magnetometer being placed in a magnetic field to be detected, the  
5        magnetic field being perpendicular to the direction of the current and  
6        producing a Lorentz Force perpendicular to the string, the Lorentz Force  
7        causing deflection in the string that can be detected.
  
- 1    2.    The magnetometer as recited in claim 1, wherein the electrically  
2        conducting string comprises an insulating fiber coated with an electrically  
3        conducting material.
  
- 1    3.    The magnetometer of claim 2, further comprising a light source, wherein  
2        the fiber is light conducting.
  
- 1    4.    The magnetometer as recited in claims 1,2, or 3 further comprising a  
2        means for varying the tension of the string or fiber.
  
- 1    5.    The magnetometer as recited in claim 4, the means for varying the tension  
2        comprising piezo elements placed under the means for supporting.
  
- 1    6.    The magnetometer as recited in claim 4, the means for varying the tension  
2        comprising a silicon substrate containing a plurality of strings or fibers of  
3        varying lengths, the current being switchable between the strings or fibers.
  
- 1    7.    A magnetometer array comprising a plurality of the magnetometers of  
2        claims 1, 2, or 3, wherein the magnetometers are joined end to end with  
3        the portion of the string or fiber connecting two magnetometers not in  
4        tension.

- 1 8. The magnetometer array as recited in claim 7, further comprising means  
2 for varying the tension in the string or fiber of each magnetometer in the  
3 array.
- 1 9. The magnetometer array as recited in claim 8, the means for varying the  
2 tension comprising piezo elements placed under the means for  
3 supporting.
- 1 10. The magnetometer array as recited in claim 8, the means for varying the  
2 tension comprising a silicon substrate containing a plurality of strings or  
3 fibers of varying lengths, the current being switchable between the strings  
4 or fibers.
- 1 11. The magnetometer of claim 3, further comprising means for detecting the  
2 motion of the fiber.
- 1 12. The magnetometer as recited in claim 11, the means for detecting  
2 comprising:  
3 a first aperture in the conducting material on the fiber; and  
4 a detector for detecting light escaping through the aperture.
- 1 13. The magnetometer as recited in claim 12, wherein the detector comprises  
2 a position sensitive lateral cell optical detector.
- 1 14. The magnetometer as recited in claim 12, wherein the detector comprises  
2 a multi-cell optical detector.
- 1 15. The magnetometer as recited in claim 12, wherein the detector comprises  
2 a CCD detector.

- 1 16. The magnetometer as recited in claim 12, further comprising a defect in  
2 the fiber surface for increasing scattered amplitude and, hence, signal-to -  
3 noise ratio.
- 1 17. The magnetometer as recited in claim 12, further comprising a scattering  
2 means in the center of the fiber for increasing scattered amplitude and,  
3 hence, signal-to-noise ratio.
- 1 18. The magnetometer as recited in claim 12, further comprising a second  
2 aperature in the conducting material on the fiber, the second aperature  
3 being orthongonal to the first aperature for simultaneous measurement of  
4 two orthongonal vector components of the motion of the fiber and, hence,  
5 two magnetic field components.
- 1 19. A method for detecting a vector magnetic field comprising the steps of:  
2 supporting an electrically conducting string in tension at two locations;  
3 inserting a current at one end of the string and extracting it at the other  
4 end;  
5 placing the string in a magnetic field perpendicular to the direction of the  
6 current in the string, thereby producing a Lorentz Force perpendicular to  
7 the string, the Lorentz Force causing deflection in the string; and  
8 detecting the deflection in the string.
- 1 20. The method as recited in claim 19, wherein the electrically conducting  
2 string comprises an insulating fiber coated with an electrically conducting  
3 material.
- 1 21. The method as recited in claims 19 or 20, further comprising the step of  
2 varying the tension of the string or fiber.
- 1 22. A method for detecting a vector magnetic field comprising the steps of:

2 supporting a light conducting fiber coated with an electrically conducting  
3 material in tension at two locations;  
4 inserting a current and light at one end of the string and extracting the  
5 current and light at the other end;  
6 placing the fiber in a magnetic field perpendicular to the direction of the  
7 current in the fiber, thereby producing a Lorentz Force perpendicular to  
8 the fiber, the Lorentz Force causing deflection in the fiber; and  
9 detecting the deflection in the fiber.

1 23. The method as recited in claim 22, further comprising the step of varying  
2 the tension of the fiber.

1 24. The method as recited in claim 23, further comprising the steps of:  
2 forming an aperture in the conducting material on the fiber; and  
3 detecting the light escaping through the aperture.

1 25. A magnetometer comprising:  
2 a mechanical resonator other than a bar, the resonator receiving a current;  
3 and  
4 means for supporting the resonator;  
5 the magnetometer being placed in a magnetic field to be detected, the  
6 magnetic field being perpendicular to the direction of the current and  
7 producing a Lorentz Force perpendicular to the resonator, the Lorentz  
8 Force causing deflection in the resonator that can be detected.